WHAT IS CLAIMED IS

Sub A1

1. An ink jet recording method of ejecting ink using an ink jet head substrate provided with a heat generating resistor which is coated with a protecting film, wherein the ink is ejected by a pressure produced by generation of a bubble created by film boiling of the ink caused by application of thermal energy to the ink through the protecting film, the thermal energy being generated by driving of said heat generating resistor, the improvement residing in that:

there is provided a recording mode in which the ink is ejected with a maximum temperature at the surface of said protecting film which is contacted to the ink not higher than 560°C.

2. A method according to Claim 1, wherein the maximum temperature is controlled by controlling a pulse width of a driving signal applied to the heat generating resistor.

3. A method according to Claim 1, wherein a temperature of the substrate is measured, driving of heat generating resistor is stopped when a discrimination is made that control is not possible to make the maximum temperature not higher than 560°C, on the basis of the temperature and a driving signal.

4. A method according to Claim 1, wherein the ink contains chelate agent.

5. A method according to Claim 4, wherein the content of the chelate agent is not less than 50 weight ppm and not more than 20 weight %.

6. A method according to Claim 1, wherein said protecting film comprises a plurality of layer, and a layer contactable to the ink is an anti-cavitation film made of amorphous alloy comprising Ta.

7. A method according to Claim 6, wherein the amorphous alloy comprises one or more metal materials selected from a group of Fe, Cr, Re, Ge and Ni.

8. A method according to Claim 7, wherein the amorphous alloy comprises Ta, Fe, Cr and Ni, and a content of Ta is not more than 30 weight % on the basis of the total weight of the amorphous alloy.

9. An ink jet head substrate comprising a heat generating resistor, a protecting film with which said heat generating resistor is coated, wherein heat generated by said heat generating resistor is applied to ink through said protecting film to eject the ink, the improvement residing in that:

a maximum temperature at a surface of said protecting film contacted to the ink is not higher than 560°C during driving of said heat generating resistor.

10. A substrate according to Claim 9, wherein said protecting film comprises a plurality of layer, and a layer contactable to the ink is an anti-cavitation film made of amorphous alloy comprising Ta.

11. A substrate according to Claim 10, wherein the amorphous alloy comprises one or more metal materials selected from a group of Fe, Cr, Re, Ge and Ni.

12. A substrate according to Claim 11, wherein the amorphous alloy comprises Ta, Fe, Cr and Ni, and a content of Ta is not more than 30 weight % on the basis of the total weight of the amorphous alloy.

13. An ink jet head comprising an ink jet head substrate including a heat generating resistor, a protecting film with which said heat generating resistor is coated, wherein heat generated by said heat generating resistor is applied to ink through said protecting film to create a bubble in the ink, thereby to eject the ink by a pressure by the creation

Sub Cl cont.

of the bubble, the improvement residing in that:

a maximum temperature at a surface of said protecting film contacted to the ink is not higher than 560°C during driving of said heat generating resistor.

14. An ink jet head according to Claim 13, wherein the ink contains chelate agent.

15. An ink jet head according to Claim 14, wherein the content of the chelate agent is not less than 50 weight ppm and not more than 20 weight %.

Sub C5

16. An ink jet head according to Claim 13, wherein said protecting film comprises a plurality of layer, and a layer contactable to the ink is an anti-cavitation film made of amorphous alloy comprising Ta.

17. An ink jet head according to Claim 16, wherein the amorphous alloy comprises one or more metal materials selected from a group of Fe, Cr, Re, Ge and Ni.

18. An ink jet head according to Claim 17, wherein the amorphous alloy comprises Ta, Fe, Cr and Ni, and a content of Ta is not more than 30 weight % on the basis of the total weight of the amorphous

alloy.

sub a4

19. An ink jet apparatus which includes an ink jet head comprising an ink jet head substrate including a heat generating resistor, a protecting film with which said heat generating resistor is coated, wherein heat generated by said heat generating resistor is applied to ink through said protecting film to create a bubble in the ink, thereby to eject the ink by a pressure by the creation of the bubble, the improvement residing in that:

there is provided driving signal control means for making a maximum temperature at a surface of said protecting film contacted to the ink not higher than 560°C during driving of said heat generating resistor.

20. An apparatus according to Claim 19, wherein said driving signal control means controls a pulse width of a driving signal applied to said heat generating resistor to control the maximum temperature.

21. An apparatus according to Claim 19, wherein said ink jet head substrate includes a temperature detecting element for measuring a temperature of said substrate, and wherein driving of heat generating

Sub A6 cont.

resistor is stopped when a discrimination is made that control is not possible to make the maximum temperature not higher than 560°C, on the basis of the temperature and a driving signal.

22. An apparatus according to Claim 21, wherein the ink contains chelate agent.

23. An apparatus according to Claim 22, wherein the content of the chelate agent is not less than 50 weight ppm and not more than 20 weight %.

Sub A7

24. An apparatus according to Claim 21, wherein said protecting film comprises a plurality of layer, and a layer contactable to the ink is an anti-cavitation film made of amorphous alloy comprising Ta.

25. An apparatus according to Claim 24, wherein the amorphous alloy comprises one or more metal materials selected from a group of Fe, Cr, Re, Ge and Ni.

26. An apparatus according to Claim 25, wherein the amorphous alloy comprises Ta, Fe, Cr and Ni, and a content of Ta is not more than 30 weight % on the basis of the total weight of the amorphous alloy.